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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,345	08/31/2006	Shigeo Ashigaki	33082M342	9535

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EXAMINER	
THOMPSON RUMMEL, PONDER N	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
10/06/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/591,345	ASHIGAKI ET AL.	
	Examiner	Art Unit	
	PONDER N. THOMPSON RUMMEL	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *1-12 and 21-23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :8/31/06, 9/29/06, 10/25/06, 1/11/2007, 11/15/2007, 7/25/2008.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-12, drawn to a peeling off and reworking method, classified in class 134, subclass 1.

   II. Claims 13-20, drawn to a processing method of a substrate, classified in class 430, subclass 323.

   III. Claims 21-23, drawn to a peeling and reworking apparatus, classified in class 156, subclass 94.

The inventions are independent or distinct, each from the other because:

2. Inventions I and II are directed to related processes. The related inventions are distinct if: (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed can be used to process a substrate without peeling and without reworking the substrate upon processing. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants.

3. Inventions I and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus

as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the peeling and reworking method of Group 1 can be performed by hand and not necessarily by the apparatus of Group II.

4. Inventions II and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the processing method of Group 1 can be performed by hand and not necessarily by the peeling and reworking apparatus of Group II. Further, processing of a substrate does not have to include the steps of peeling and reworking of the resist. The processing of a substrate can include imaging and developing the substrate to obtain a desired pattern.

5. During a telephone conversation with Michael Makuch on November 19, 2007 a provisional election was made with traverse to prosecute the invention of Group II, claims 13-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-12 and 21-23 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

(a) the inventions have acquired a separate status in the art in view of their different classification;

(b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

(c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);

(d) the prior art applicable to one invention would not likely be applicable to another invention;

(e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention**.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after

the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 13 and15 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagahara et al (US 2003/0170993).

Nagahara et al discloses a process of processing or manufacturing a semiconductor device comprising:

- Depositing a first interlayer film on a substrate wherein the film can be an SiC based film (paragraph [0081]) and etching the film to form a hard mask by using the resist film pattern (paragraph [0019]);
- Forming a second pattern by sing the hard mask and pattern as a mask (paragraph [0019])
- Removing the film/residue with an organic peeling liquid (paragraph [0076]) and a thinner (paragraph [0072]) wherein the liquid comes in contact with the film (paragraph [0065]).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara et al (US 2003/0170993) in view of Angelopoulos (US 6,316,167).

Nagahara et al discloses the processing method of claim 14 above, however fails to mention a Si-C film having anti-reflection and hard mask functions.

Angelopoulos et al discloses a vapor deposited material such as an RCHX film (wherein R can be Si - column 5, lines 60-65) that can behave as an antireflective film and a hard mask (column 8, lines 37-40). The SiCHX film

provides good etch selectivity (column 7, lines 54-55) and can reduce film interference and substrate reflectivity (column 8, lines 39-41). Therefore, it would have been obvious to one of ordinary skill within the art would incorporate the SiCHX having hard mask and antireflective functions as taught by Angelopoulos within the process of Nagahara to reduce interference and substrate reflectivity by not significantly changing the chemical and physicals properties of hard mask upon exposure (column 5, lines 54-56).

11. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara et al (US 2003/0170993) in view of Ahn et al (US 2003/0157441).

With respect to claims 16 – 19, Nagahara discloses the processing steps of claims 13 and 15 above, however fails to mention the use of an acetone based thinner.

Ahn et al discloses a thinner composition and a method of stripping a photoresist wherein an acetone based thinner (propylene glycol mono methyl ether acetate and PGME – paragraph [0018]) is used. Further, the thinner is sprayed with the composition by being rotated (paragraph [0041]) so that there is uniform coating of the thinner onto the photoresist (paragraph [0038]). The substrate can also be dipped into a bath that comprises the thinner solution (paragraph [0047]). By including the use of PGMEA and PGME, the edge bead removal (EBR) characteristics of the thinner composition increases, thus improving stripping or peeling capabilities of the resist (paragraphs [0014],

[0034]). Additionally, the thinner composition can be manufactured at lower cost (paragraph [0014]). Finally, after stripping, a reworking process can be carried out (paragraph [0045]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the acetone-based thinner as disclosed by Ahn in the process of Nagahara et al to increase EBR which further improves stripping capabilities of the resist and to lower cost in manufacturing the thinner composition.

12. Claims 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara et al (US 2003/0170993) in view of Jeon et al (US 6,159,646).

With respect to claims 17, 19 and 20, Nagahara discloses the processing steps of claim 13 above, however fails to mention the additional step of reworking the substrate before the first etch.

Jeon discloses a reworking method wherein a thinner is used (column 12, lines 50-52). Substrates are reworked to remove or peel (see column 3) any photoresist that was unsuccessfully coated onto the wafer during the etching process. A malfunction occurs during the etching process causing etching failure such as exposure failure or pattern failure. The thinner is supplied to the substrate by a nozzle upon rotation of the substrate (column 12, lines 51-55). After reworking the substrate, the resist is recoated and then etched. The

purpose of the reworking before etching is to correct any problems associated with coating of the resist.

Therefore, it would have been obvious to one of ordinary skill within the art to incorporate a step of peeling and reworking the resist as disclosed by Jeon et al before etching process disclosed by Nagahara et al to correct any malfunctions such as exposure or pattern failure, that occur upon unsuccessful coating of the resist.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PONDER N. THOMPSON RUMMEL whose telephone number is (571)272-9816. The examiner can normally be reached on Monday-Friday 7:00 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. N. T./
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795